



Arkansas Water Plan Update



Industrial Water Demand and Forecasting Technical Work Group: Agenda & Key Questions

January 16, 2013 10:00 a.m. – 12:00 p.m.

Meeting Purposes:

1. Provide a detailed overview of the draft industrial water demand forecast methodology.
2. Identify and discuss major factors (“drivers”) to include in the quantification of current and future industrial water use.
3. Obtain support from the Industrial Water Demand Technical Working Group to have CDM Smith begin the path forward in the development of the scenarios and assumptions, and completion of the draft industrial water demand forecast.

The role of the Technical Working Group is to review the draft methodology, provide input and information, and work with the consultant to ultimately develop the draft industrial water demands for the Arkansas Water Plan Update.

Agenda:

10:00 a.m. – 10:15 a.m. – Review of December 17th demand methodology meeting

10:15 a.m. – 10:45 a.m. – Outline of industrial water demand forecast methodology, available data, and preliminary assumptions

10:45 a.m. – 12:00 p.m. – Discussion/Questions

Initial Approach and Assumptions

The term “industrial water demand” refers to water needs of commercial, industrial, mining, and other activities not provided with water through municipal systems, and excluding agricultural activities.

It should be noted that the draft methodology white paper is to serve as an initial outline for approaching water demand forecasting for the Arkansas Water Plan Update. Any assumptions presented may be adjusted or revised based upon the input and expertise of the Technical Working Group and incorporation of data and new information as we conduct data collection and analysis.

Typically, forecasting non-residential water use, such as commercial and industrial water demand, is achieved by applying some index of economic activity (the driving factor) to baseline water use. Drivers are factors that could directly impact water use through the



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demand for industrial production or significantly impact water use per unit of production. There are a large number of complexities that could affect the spectrum of industrial drivers.

There are social and economic drivers that could be argued to create an atmosphere of either increasing or decreasing industrial growth. A few factors that could impact growth include, but are not limited to: commodity prices, availability of labor and employment growth, availability of water, competition with other demand sectors, new or changing regulatory requirements, changes in national policies, and/or changes in worldwide or national consumer patterns. Potential changes in water use per unit of production add additional complexities.

It is anticipated that it will be difficult to establish specific probabilities of occurrence with any specific individual or combination of drivers and their associated effect (increase and/or decrease) on industrial production or growth. With these points in mind, CDM Smith recommends the following as the starting point for the approach to the forecast:

- a. Initial assumption – For commercial, industrial, and mining water demand, future water use is driven by the projected rate of growth or decline in employment by industry type in each county. This approach inherently assumes that the relationship between employment, productivity, and water use remain constant into the future. Other appropriate drivers of future demand may be considered if credible and consistent data are identified and available.
- b. Potential modification to this initial assumption will be evaluated during data collection to determine if there are geographic-specific or other technical, social, economic or regulatory drivers that would warrant inclusion in the forecast methodology.
- c. For the shale gas sector, we are exploring data and options to characterize drivers that will impact future water demands in this sector. Examining projections in national shale gas production as developed by the U.S. Energy Information Administration is one option that has been considered. Preliminary feedback has also encouraged an exploration of the potential for natural gas well development in Arkansas and its relationship to water use.
- d. Initial assumption - For mining activities not classified under shale gas production, future water use is driven by the projected rate of growth or decline in employment in the mining industry (excluding natural gas related activities) in each county. Other appropriate drivers of future mining water demand may be considered if credible and consistent data are identified and available.

Data collection and research will diligently seek to identify and quantify any major drivers that should be incorporated into the forecast. The remainder of this paper presents key



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questions and discussion items that will help refine these initial assumptions and/or to identify key drivers.

Discussion Items/Key Questions:

The following discussion items are grouped into self-supplied commercial and industrial use, self-supplied shale gas water use, self-supplied mining water use, and other discussion items.

Self-Supplied Commercial and Industrial Water Use

- Our recommendation is to establish a baseline level of self-supplied commercial and industrial withdrawals by county using an analysis of multiple years of withdrawal data from the ANRC Water-Use Registration Database (WUDBS).
 - Data from multiple years will be used to determine average annual withdrawals by county unless a significant shift in use is evident in the data warranting consideration of a baseline level of use pertaining to a particular representative time period. Quality of the data may determine the feasibility of this approach.
- Employment projections by Workforce Investment Area (WIA) (from 5 to 12 counties per area) are available from the Arkansas Department of Workforce Services. These employment projections are grouped by North American Industrial Classification System (NAICS) categories for 2008 and 2018 (state-level data for the years 2010 and 2020 have been developed but are not yet available by WIA). The rate of employment growth (or decline) by NAICS categories from each WIA will be assigned to the baseline water use for the counties in the respective WIA.
 - These employment projections are by large geographic areas and are assumed to be applicable to individual counties within each area.
 - The employment growth rates only extend to 2018 and will need to be extended to 2050.
- Are there more preferable metrics known that can be used to drive future commercial and industrial water demand (e.g., industry-specific levels of production or gross domestic product)? If so, these metrics must be available for consistent use and application for statewide planning purposes.

Shale Gas Water Use

- Preliminary discussion with work group members from this water use sector indicates that we may need to get additional process related data on the relationship between well development, gas production and water use. Prior to these discussion a few preliminary ideas on data and possible approaches have been developed and are provided below.



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- The relatively recent rapid expansion and variable nature of the shale gas industry makes it difficult to establish a representative baseline level of water use. Furthermore, the quality of the WUDBS withdrawal data has not been fully explored but initial review shows a limited number of years of data and significant variability in annual withdrawals. As an initial approach, it is recommended to establish a baseline level of withdrawals by county using an analysis of multiple years of withdrawal data from the ANRC WUDBS.
 - Data from multiple years will be used to determine average annual withdrawals by county unless a significant shift in use is evident in the data warranting consideration of a baseline level of use pertaining to a particular representative time period. Quality of the data may determine the feasibility of this approach.
- The ANRC WUDBS is the best known data available with respect to shale gas water withdrawals in Arkansas. Other data sources and methods could be explored in order to estimate current Fayetteville shale gas water withdrawals:
 - Estimated water requirement per well times number of active wells
- A method utilizing EIA shale gas production projections would involve applying the projected rate of growth in national shale gas production to baseline natural gas production water withdrawals to forecast future water demands in Arkansas.
- Relating trends and potential for gas well development and associated water use will be explored:
 - A report conducted by the State Review of Oil and Natural Gas Environmental Regulations, Inc. (STRONGER) for the Arkansas Oil and Gas Commission indicates the potential for an additional 10,000 wells in the Fayetteville Shale.¹ Is this a realistic maximum for shale gas well development in Arkansas?

Self-Supplied Mining Water Use

- Our recommendation is to establish a baseline level of self-supplied mining withdrawals by county using an analysis of multiple years of withdrawal data from the ANRC WUDBS.
 - Data from multiple years will be used to determine average annual withdrawals by county unless a significant shift in use is evident in the data

¹ This report states that there are currently 4,000 active wells in the Fayetteville Shale and there is the potential for the development of 14,000 wells. Please see page 4 of the STRONGER report *Arkansas Hydraulic Fracturing State Review*, February 2012: www.aogc.state.ar.us/notices/AR_HFR_FINAL.pdf.



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warranting consideration of a baseline level of use pertaining to a particular representative time period. Quality of the data may determine the feasibility of this approach.

- We recommend applying the projected mining employment rate of growth or decline by county to baseline mining withdrawals to forecast future withdrawals by county.

Other Points of Discussion

- Are there reasonable foreseeable indicators of emerging growth in the commercial, industrial, or mining sectors that should be included in the forecast? Can any reasonable estimate be made regarding location and water use in regard to possible emerging demand sectors?
- Water demands for municipally-supplied businesses and industries within each county will be addressed in concert with this work group. Coordination will be required to avoid overlap or double-counting of water demands. Therefore, the methodology proposed for municipally-supplied businesses and industries is outlined in the following bullets.
- The WUDBS includes data that identifies the municipally-supplied water deliveries for the following non-domestic water use categories: commercial, industrial, mining, agriculture, and irrigation. Industry type or activity is cannot be identified from this database.
- It is recommended to use the WUDBS to extract historical municipally-supplied non-domestic water deliveries by water use type to establish baseline levels of municipally-supplied deliveries by water use type for each county.
 - Data from multiple years will be used to determine average annual municipally-supplied non-domestic usage by county unless a significant shift in use is evident warranting consideration of a baseline level of use pertaining to a particular representative time period. Quality of the data may determine the feasibility of this approach.
- It is recommended that projected rates of growth or decline for broad employment categories be used to drive future water use for the municipally-supplied non-domestic water use categories listed above. The table below links the municipally-supplied non-domestic water use category with the proposed broad employment category that will be used to drive future water demands.



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Sub-Sector	WUDBS Municipally-Supplied Water Use Category	Employment Group (NAICS) Driving Future Water Demand
Industry	Industrial	31-33 - Manufacturing
Mining	Mining	21 – Mining, Quarrying, and Oil and Gas Extraction
Agriculture	Agriculture	11 – Agriculture, Forestry, Fishing and Hunting
Commercial	Commercial	All other employment groups
Irrigation	Irrigation	None

- It is recommended to explore other data sources through which major non-domestic municipally-supplied water users can be identified by county. The business type, water source, and average water use for these users must be identifiable. For these users, the rates of growth in employment for more specific employment groups can be used to drive future demands for water.